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(54) Title: **PROSTHETIC VALVES AND METHODS OF MANUFACTURING**

Carbon fiber reinforced  
graphite substrate



Nanostructure aligned surface layer

Carbon nanofiber reinforced PyC

(57) Abstract: The present invention relates to novel design of mechanical valve prostheses and manufacturing methods. A series of prosthetic valves with novel design and a unique manufacturing approach are disclosed. These devices possess unique designs and are made of nanostructure engineered biomaterial. In addition, a novel manufacturing approach will be used to produce these devices because the convention technique is incapable of fabricating the devices due to the small size, design requirements and material properties restrain. Furthermore, it provides the convenience and thus low cost in manufacturing. The devices are particularly but not exclusively useful in human circulation system to restore the normal functions.



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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/38066

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : A61P 2/24

US CL : 623/2.42

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 623/2.1, 2.12, 2.19, 2.2, 2.26-2.33, 2.35, 2.42; 427/2.24, 2.25, 249.1; 264/29.2

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X — A	US 3,932,898 A (WRIGHT) 20 January 1976 (20.01.1976), see Figure 4, column 2, lines 8-14.	1-3, 5 — 4
X — A	US 5,326,372 A (MHATRE et al) 05 July 1994 (05.07.1994), see Figures 1-4, Figures 5-8, column 5, lines 45-60.	7, 8, 11-14, 16-25, 27, 38-40 — 9, 15, 26
X — Y	US 6,039,759 A (CARPENTIER et al) 21 March 2000 (21.03.2000), see Figures 12-14 and 21-23, column 6, lines 64-65, column 13, lines 7-58.	28, 30-34, 37 — 35
Y — A	US 2001/0025197 A (SHU et al) 27 September 2001 (27.09.2001), see paragraph [0006].	35 — 36
A	US 6,199,278 B1 (RYDER et al) 13 March 2001 (13.03.2001), see column 2, lines 34-42.	6, 10, 41



Further documents are listed in the continuation of Box C.



See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means	
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## C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6,051,167 A (WITHERS et al) 18 April 2000 (18.04.2000), see entire document.	42
A	EP 1 277 858 A1 (NIKKISO COMPANY LIMITED) 22 January 2003 (22.01.2003), see entire document.	43-48